EOS 2023

# IMAGING NEOVASCULAR AMD

## FOCUS ON OCT & OCT-A

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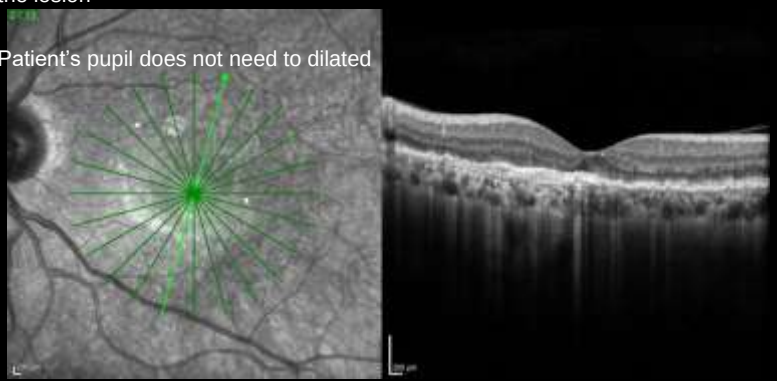
CERTIFIED SPECTRALIS® HRA+OCT OPERATOR: RETINA & GLAUCOMA - HE ACADEMY, HEIDELBERG, GERMANY
HARVARD-CERTIFIED UWF IMAGE GRADER - ICARE RESEARCH AND READING CENTER (IRRC)

- Combined High-resolution OCT and cSLO fundus imaging through splitting of light beam at its source.
- High-quality cSLO fundus image provides exact lesion localisation
- High-resolution OCT provides detailed examination of retinal layers corresponding to the lesion
- Patient's pupil does not need to dilated



- **Advantages in AMD:**

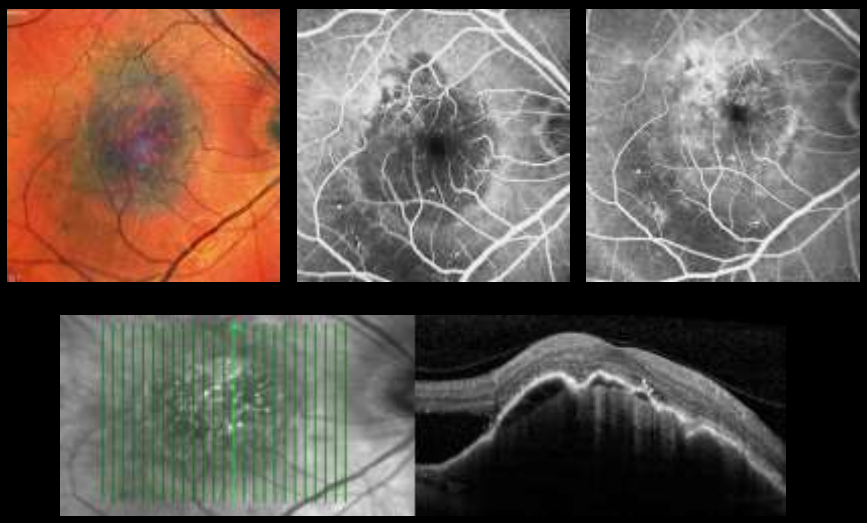
1. Detailed examination of retinal and subretinal layers
2. Quantitative measurements of macular changes
3. Monitoring disease progression
4. Monitoring therapeutic effects of anti-VEGF Rx

- Allows blood flow detection based on motion contrast derived from variation in signal amplitude over time within a voxel due to movement of blood cells.[1-3]
- **Advantages over FFA:**[4-6]

1. Non-invasive
2. Depth-resolved
3. Detailed assessment of retinal and choroidal vasculature
4. Detailed characterisation of NV
5. Detection of non-exudative type-I NV


1. Coscas G, Lupidi M, Coscas F. Heidelberg Spectralis optical coherence tomography angiography: technical aspects. Dev Ophthalmol. 2016;56:1-5.
2. Huang D, Jia Y, Gao SS, et al. Optical coherence tomography angiography using the Optovue device. Dev Ophthalmol. 2016;56:6-12
3. Rosenfeld PJ, Durbin MK, Roisman L, et al. ZEISS Angio- plex spectral domain optical coherence tomography angiog- raphy: technical aspects. Dev Ophthalmol. 2016;56:18-29
4. De Carlo T, Romano A, Waheed N, Duker J. A review of optical coherence tomography angiography (OCTA). Int J Retina Vitreous. 2015;1:5
5. Nehemy MB, Brocchi DN, Veloso CE. Optical coherence tomography angiography imaging of quiescent choroidal neovascularization in age-related macular degeneration. Ophthalmic Surg Lasers Imaging Retina. 2015;46:1056-1057.
6. Roisman L, Zhang Q, Wang RK, et al. Optical coherence to- mography angiography of asymptomatic neovascularization in intermediate age-related macular degeneration. Ophthal- mology. 2016;123:1309-1319

## RPE DETACHMENT “PEDS”



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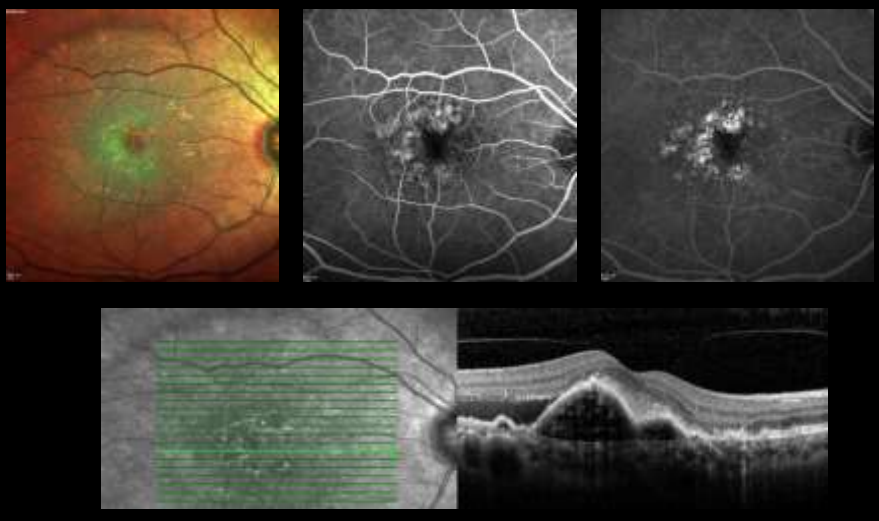

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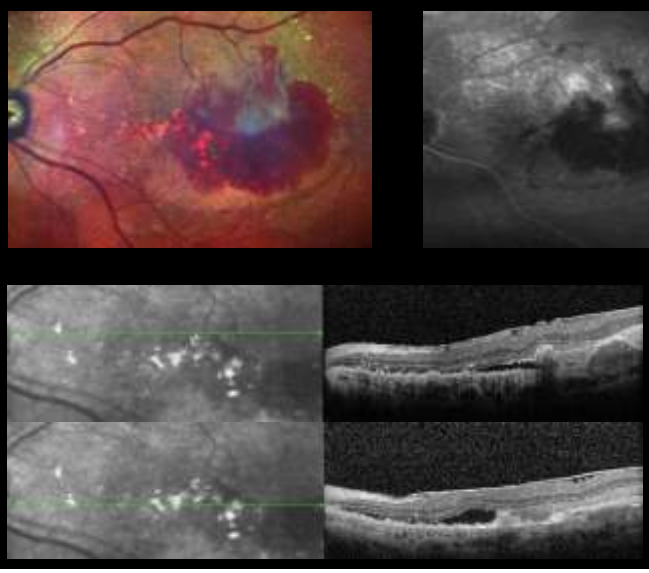
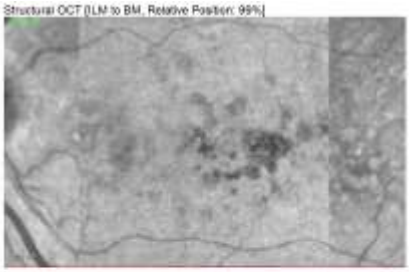
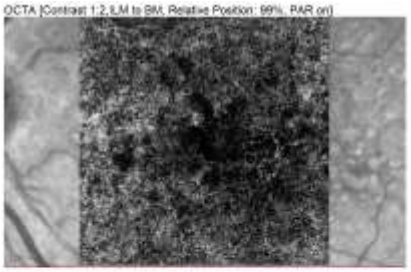


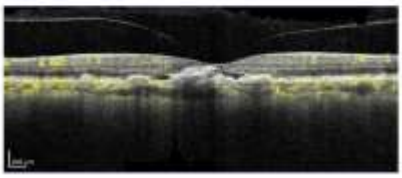
Structural OCT (ILM to BM, Relative Position: 99%)



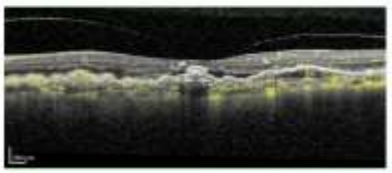
OCTA (Contrast 1:2,ILM to BM, Relative Position: 99%, PAR on)



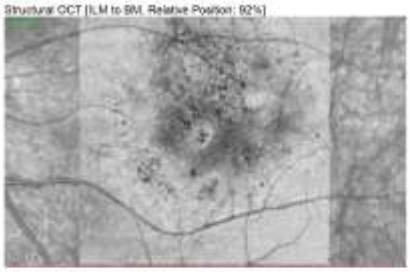
100% Struct. + 100% OCTA (Orthogonal)



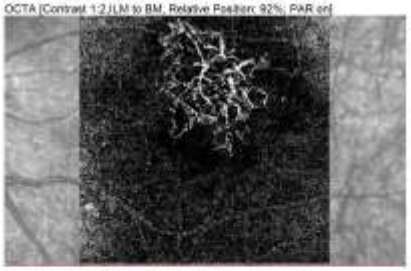
100% Struct. + 100% OCTA



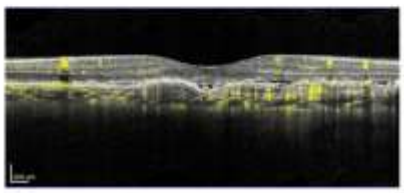
Structural OCT (ILM to BM, Relative Position: 92%)



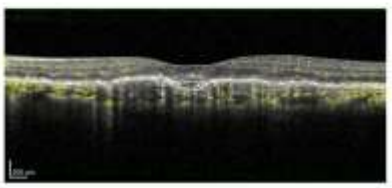
OCTA (Contrast 1:2,ILM to BM, Relative Position: 92%, PAR on)

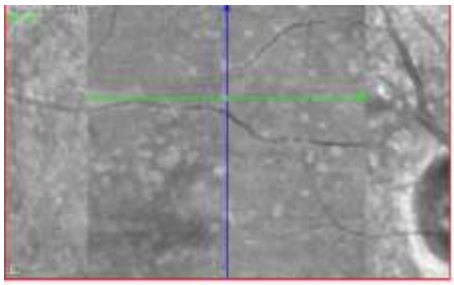


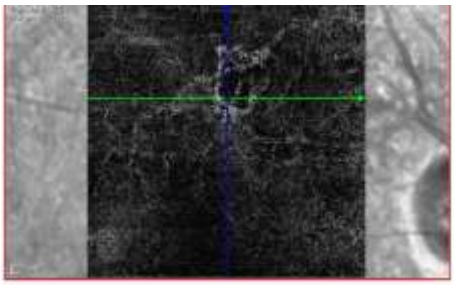
100% Struct. + 100% OCTA (Orthogonal)

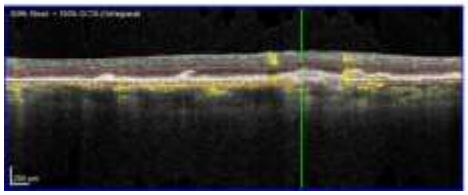


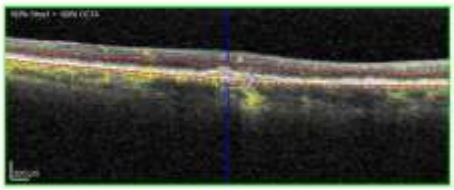
100% Struct. + 100% OCTA



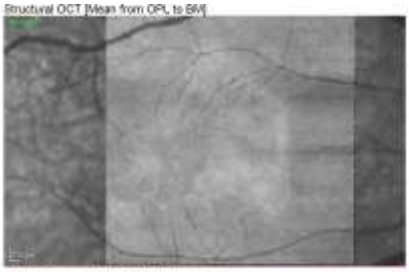






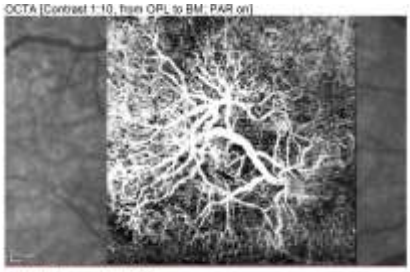


Structural OCT [Mean from OPL to BM]

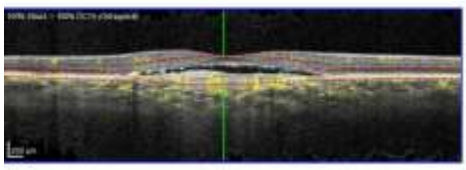


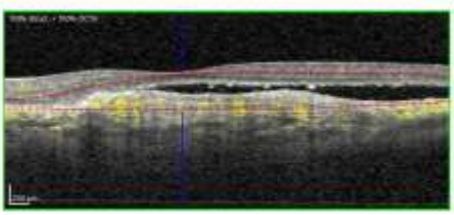
100% Struct + 100% OCTA (Orthogonal)

OCTA [Contrast 1:10, from OPL to BM, PAR on]

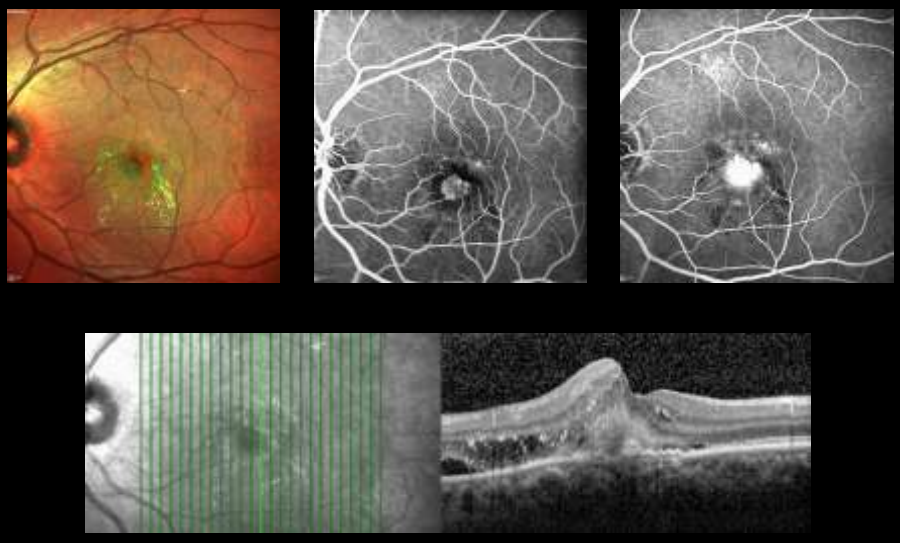


100% Struct + 100% OCTA





SRNVMS



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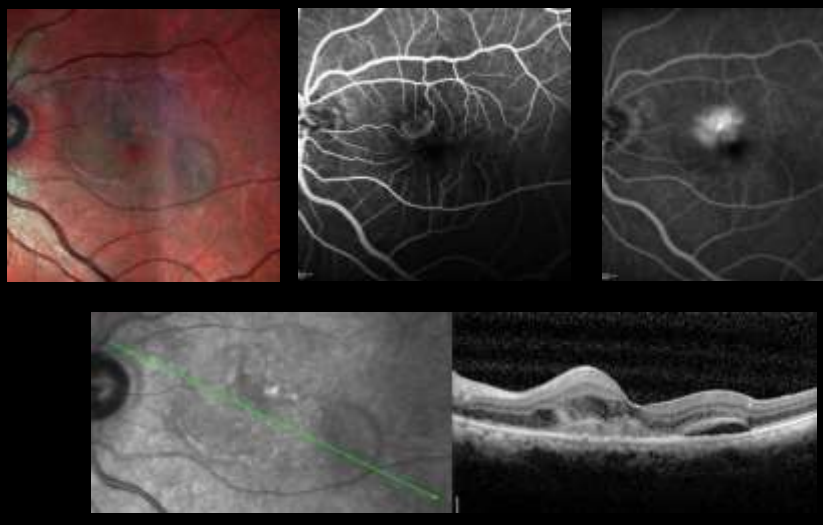
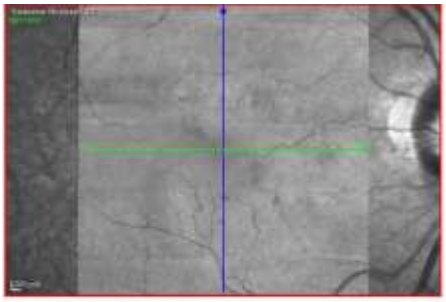
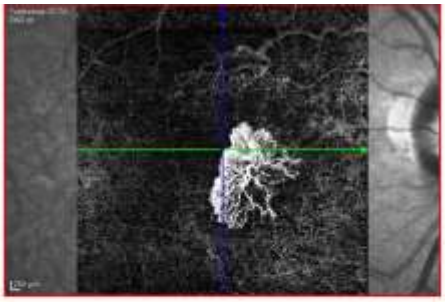
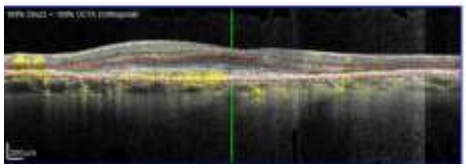
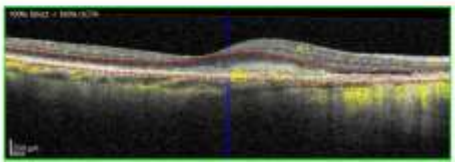
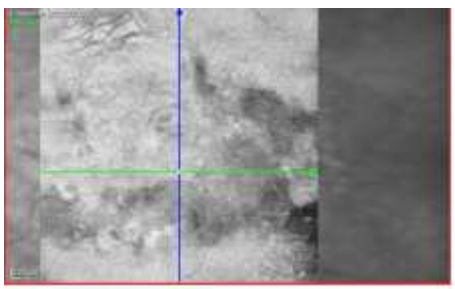


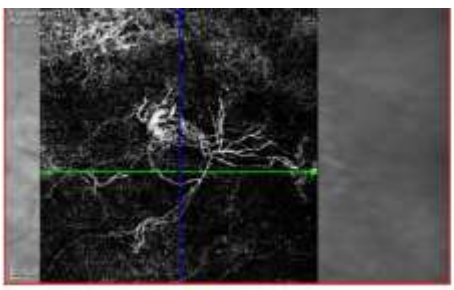


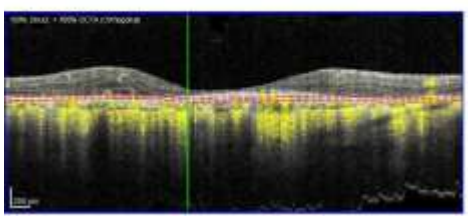


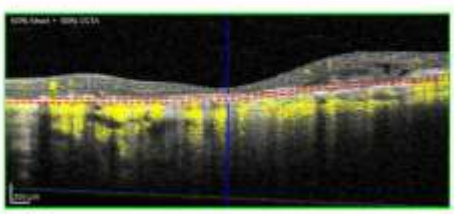


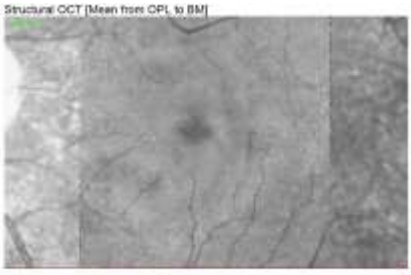


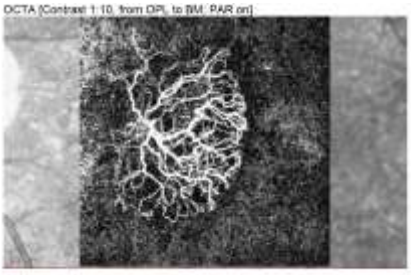




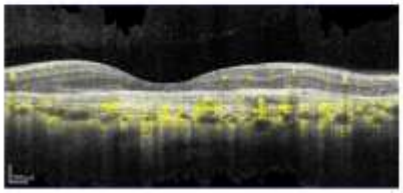




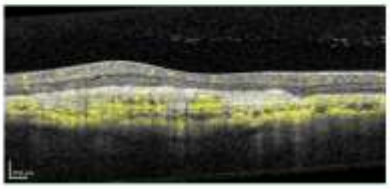


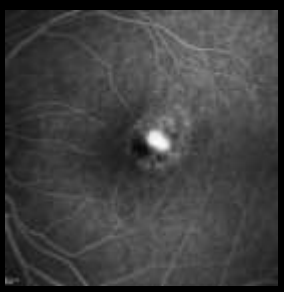

100% Struct. + 100% OCTA (Orthogonal)

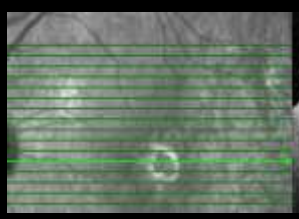


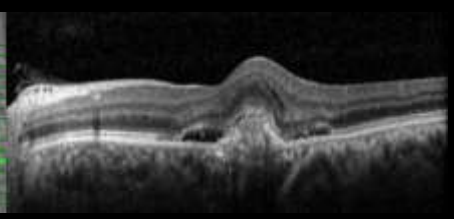
100% Struct. + 100% OCTA



## RAP LESIONS







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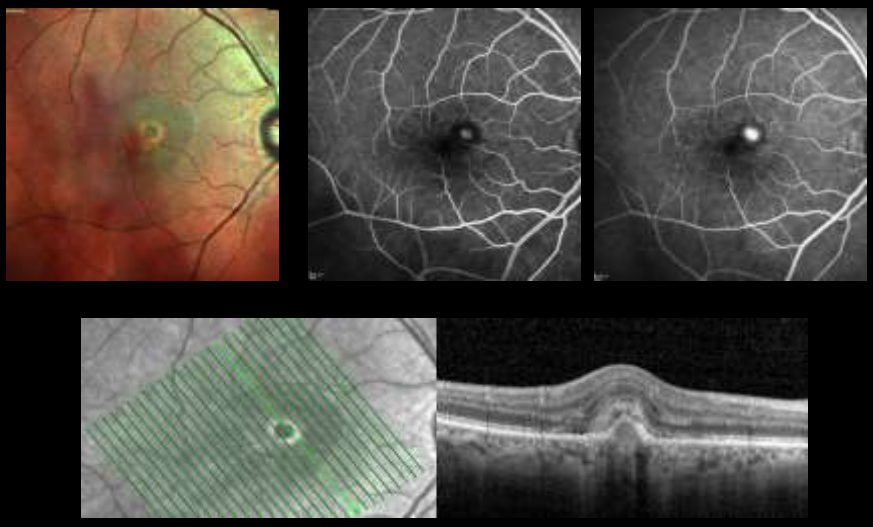
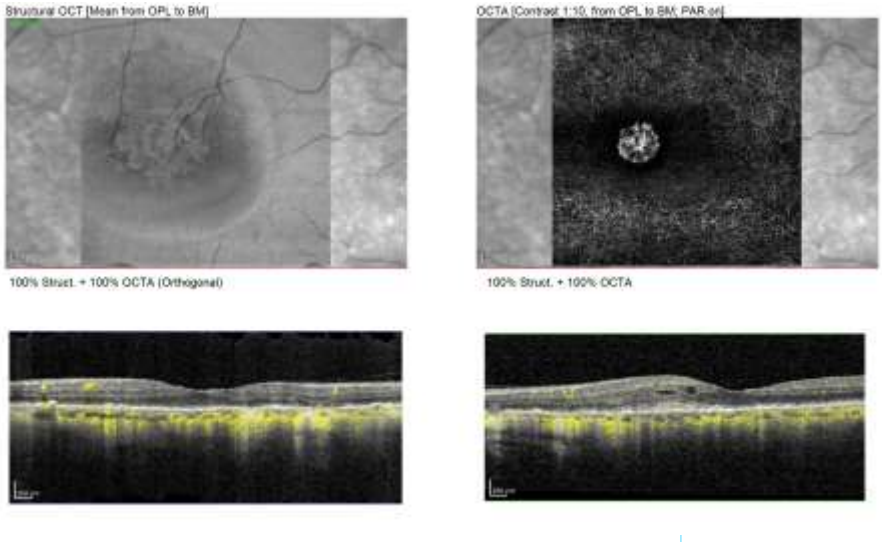
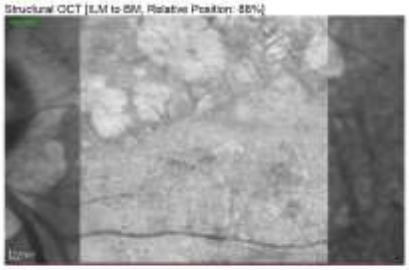
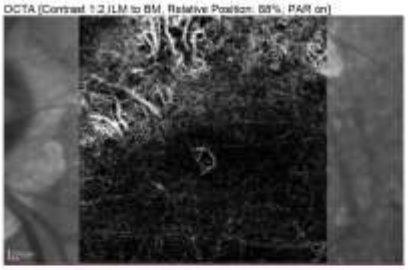



Structural OCT [Mean from OPL to BM]
100% Struct. + 100% OCTA (Orthogonal)
OCTA [Contrast 1:10, from OPL to BM, PAR adj]
100% Struct. + 100% OCTA

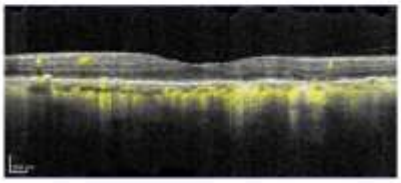
Structural OCT [LM to BM, Relative Position: 88%]



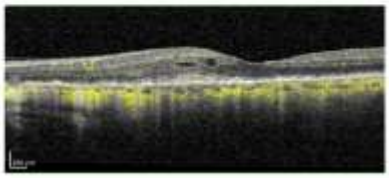
OCTA [Contrast 1:2 /LM to BM, Relative Position: 88%, PAR on]



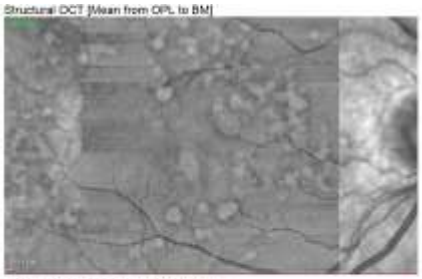
100% Struct. + 100% OCTA (Orthogonal)



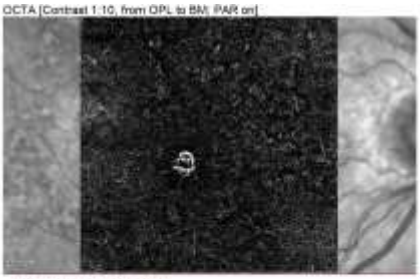
100% Struct. + 100% OCTA



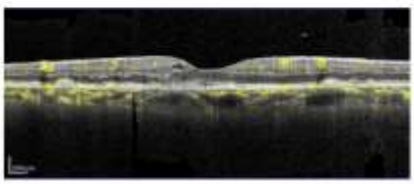
Structural OCT [Mean from OPL to BM]



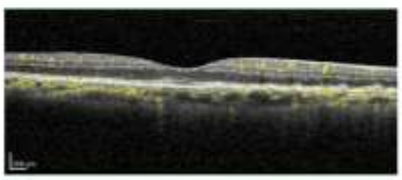
OCTA [Contrast 1:10, from OPL to BM, PAR on]



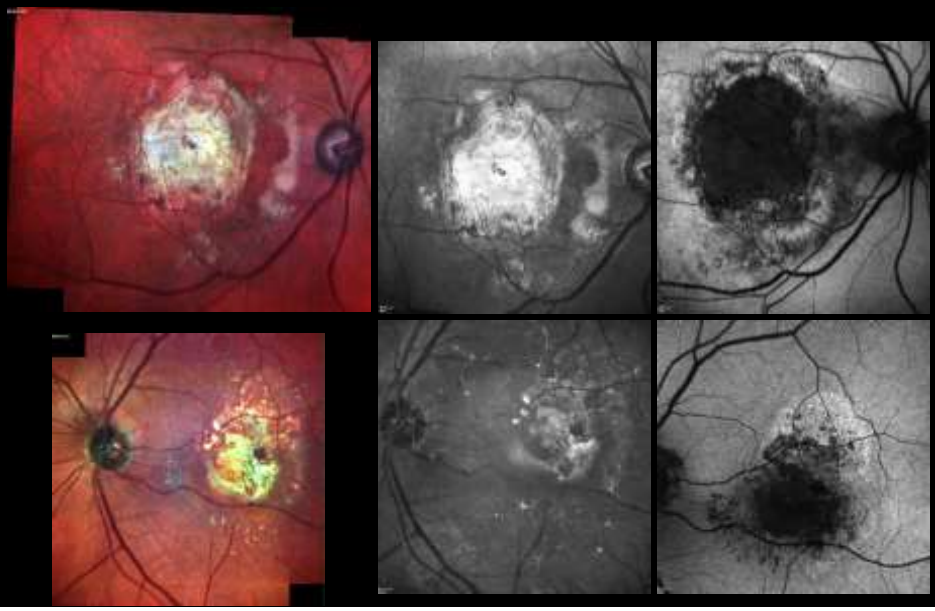
100% Struct. + 100% OCTA (Orthogonal)



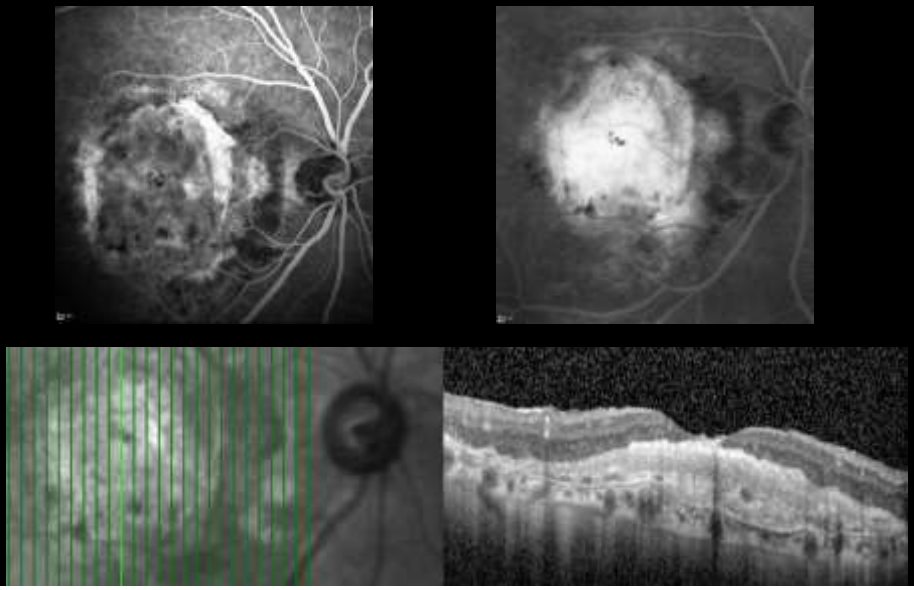
100% Struct. + 100% OCTA



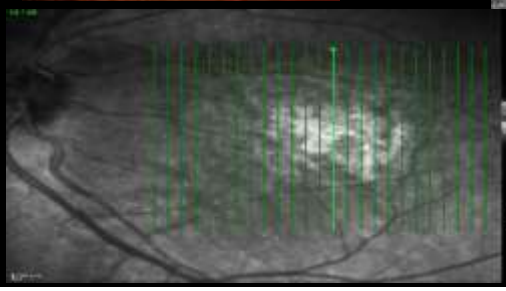
## DISCIFORM SCARS

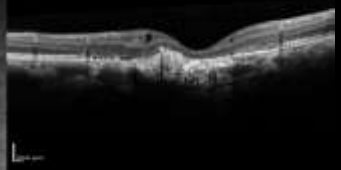


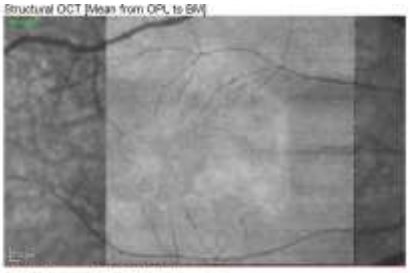
## DISCIFORM SCARS



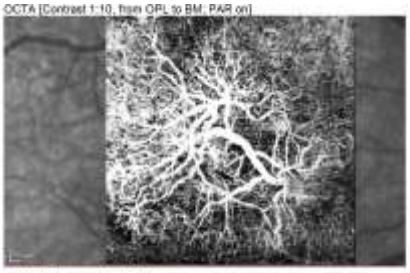
# DISCIFORM SCARS



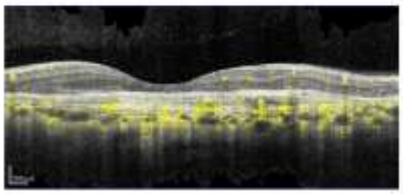


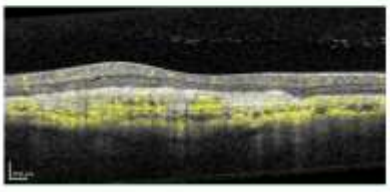



100% Struct + 100% OCTA (Orthogonal)




100% Struct + 100% OCTA



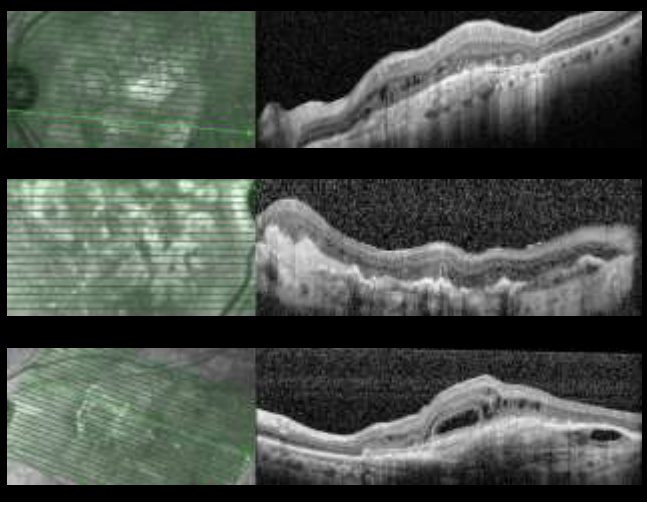


## OCT BIOMARKERS OF ATROPHY

- Represent advanced disease process
- Any form of advanced AMD
- Include:
  - Outer retinal tubulations ORTs
  - Outer retinal corrugations
  - Age-related choroidal atrophy
  - Hyporeflective atrophic wedges
  - Splitting of band-4

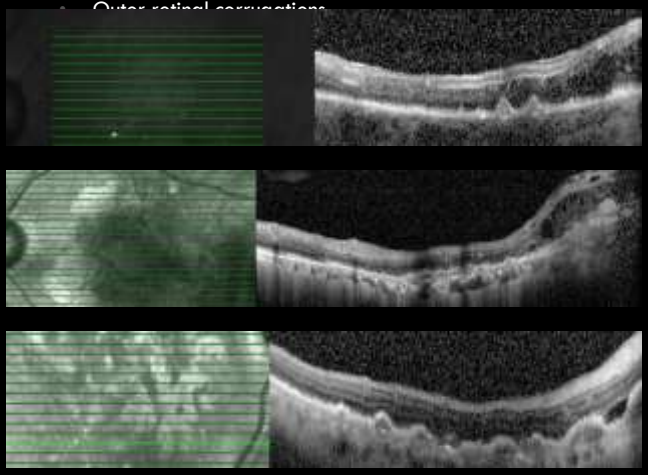
## OCT BIOMARKERS OF ATROPHY

- Outer retinal tubulations ORTs



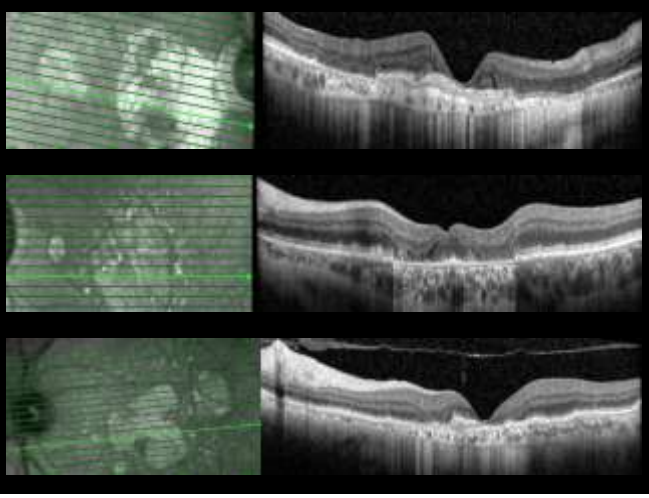
## OCT BIOMARKERS OF ATROPHY

- Outer retinal corrugations



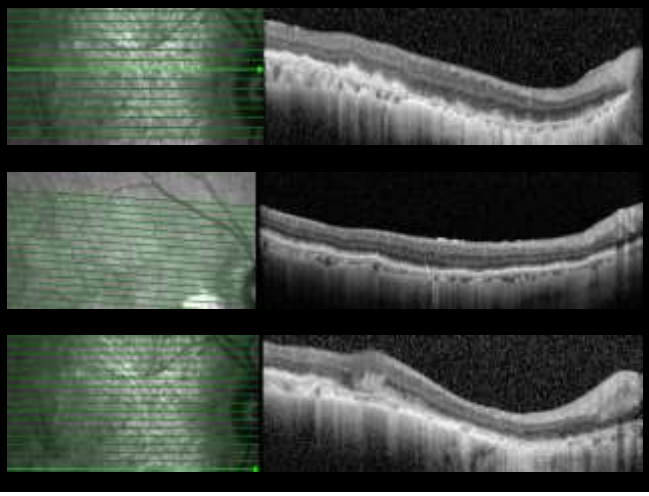
## OCT BIOMARKERS OF ATROPHY

- Hyporeflective atrophic wedges



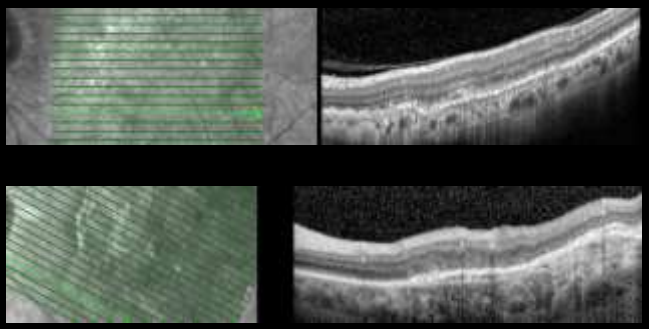
## OCT BIOMARKERS OF ATROPHY

- Age-related choroidal atrophy ARCA



## OCT BIOMARKERS OF ATROPHY

- Splitting of band-4



## TAKE HOME MESSAGE

- OCT is crucial for management of AMD patients
- Risk factors of disease progression
- Biomarkers of disease activity
- Biomarkers of atrophy

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- OCT is crucial for management of AMD patients
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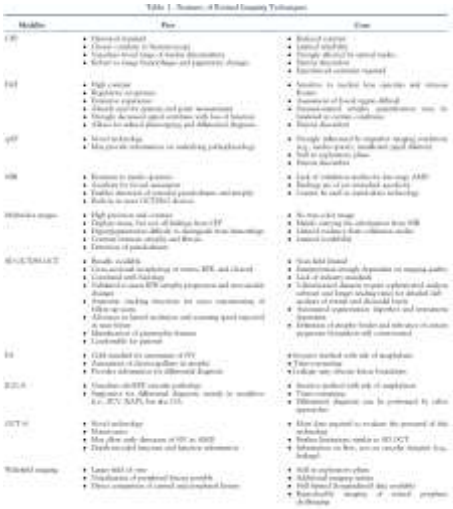
# TAKE HOME MESSAGE

- OCT-A a non-invasive tool for assessment of retinal and choroidal circulation
- OCT-A and non-exudative CNV
- Limitations … Artefacts

**Imaging Protocols in Clinical Studies in Advanced Age-Related Macular Degeneration**

*Recommendations from Classification of Atrophy Consensus Meetings*



# TAKE HOME MESSAGE

- CAM imaging protocols for AMD:
- For patients with non-nAMD:
  - Baseline & follow-up MCI, IR, FAF, SD-OCT targeting GA area.
  - FFA is recommended if secondary NV is suspected
- For patients with nAMD:
  - Baseline & follow-up “6 months” FAF, FFA
  - MCI, IR imaging in ass. with FFA visits
  - Baseline & follow-up SD-OCT
  - Optional OCT-A

Table 3. Recommendation for Use Studies with Neovascular Age-Related Macular Degeneration

| Modality | System Requirements | Protocol | Use at Baseline (Purpose) | Use at Follow-up (Purpose) | Use at End of Study (Purpose) |
|---|---|---|---|---|---|
| CFP | Digital system | 3-field: 30° × 50° | R<br>Establishing diagnosis<br>Detecting hemorrhages<br>Detecting fibrosis<br>Detecting atrophy | R for each visit with FA or FAF (not at each visit, rather approximately every 6 mos)<br>Detection of hemorrhage/fibrosis | R<br>Monitoring long-term follow-up |
| FAF | SLO (blue light) | 3-field 30° | R<br>Establishing diagnosis<br>Detection and quantification of atrophy | R at selected visits (approximately every 6 mos)<br>Detection/monitoring of atrophy | R<br>Detection/monitoring of atrophy |
| qAF | Individual decision | n/a | O<br>Exploratory purposes | O<br>Exploratory purposes | O<br>Exploratory purposes |
| NIR | SLO | At least 3-field 30° | R<br>To complement FAF | R at selected visits<br>To complement FAF | R<br>To complement FAF |
| Multicolor imaging | SLO | 3-field 30° | O<br>Alternative to CFP (validation to CFP limited) | O<br>Alternative to CFP (validation to CFP limited) | O<br>Alternative to CFP (validation to CFP limited) |
| SD-OCT/ SS-OCT | Preferably same system at all trial sites | >6 × 6 mm (depending on lesion size) with no >120 μm between scans | R<br>Establishing diagnosis<br>Assessment of NV | R<br>Monitoring atrophy progression<br>Evaluating NV activity<br>Detecting RPE atrophy | R<br>Monitoring atrophy progression<br>Evaluating NV activity<br>Detecting RPE atrophy |
| FA | Digital system | Central 30° or 50°<br>Mid-phase 3-field<br>Late phase until 10' | R<br>Detection, classification and quantification of NV | R for selected visits (approximately every 6 mos)<br>Detection, classification, and quantification of NV | R<br>Detection, classification, and quantification of NV |
| ICG-A | Digital system | Central 30° or 50°<br>Mid-phase 3-field<br>Late phase until 25 min | O depending on trial region<br>Establishing diagnosis<br>Classification of NV<br>Quantification of NV | O for selected visits (every 6 mos in particular NV subtypes)<br>Quantification of NV | O<br>In particular NV subtypes<br>Quantification of NV |
| OCT-A | Individual decision | To be established (currently: 3 × 3 or 6 × 6) | O<br>Exploratory purposes | O<br>Exploratory purposes | O<br>Exploratory purposes |
| Widefield imaging | SLO | Pseudocolor and FAF | O<br>Exploratory purposes | O<br>Exploratory purposes | O<br>Exploratory purposes |


THANK YOU